Marine Corps already delivering burn-resistant battle garb to Iraq

Marine Corps Times, March 12, 2007

By John Hoellwarth, Staff writer

A camouflage utility uniform will ignite in exactly four seconds when hit with a flamethrower. And it will keep burning once it catches fire.

When that happens, an attack from which a Marine could walk away gets more complicated — fast.

It's a mounting concern in Iraq, where the growing sophistication of roadside bombs is turning trucks and Humvees into blast furnaces once they've been hit.

But it doesn't have to be that way.

"[If NASCAR drivers] can sit in a burning car for 20 seconds and be out of the hospital the next day, why can't Marines be better protected in a burning Humvee?" asked John Hernandez, of Marine Corps Systems Command at Quantico, Va.

Hernandez and others at SysCom think they've found the answer. It's called Flame-Resistant Operational Gear, or FROG, and it includes new gloves, balaclava, long-sleeve undershirt, cammy tops and bottoms. Put together, FROG will "significantly reduce the risk" of burn injuries to Marines operating in harm's way, SysCom officials say.

Even so, FROG is "still not going to make you invincible," Hernandez said. "We want Marines to know that even if you double this gear, you're not a fireman and you can't go running into a burning building to save a kitten."

The full set is expected to hit the fleet in April. And with new gear comes a new way to wear it, one that will seem familiar to Marines who took part in the spring 2003 invasion of Iraq. At the time, when biological and chemical attacks were considered a threat, Marines wore chem-bio gear at different levels, called Mission Oriented Protective Posture, or MOPP.

The FROG ensemble is scalable, meaning commanders can determine the level of fire protection each Marine will wear for a given mission, Hernandez said, much in the same way that Marines dressed in MOPP 1, MOPP 2, etc., four years ago.

SysCom officials refer to the standard combat utility uniform as FROG 0. In FROG 1, the Marine, instead of wearing his standard green undershirt, wears a long-sleeve shirt under his cammies. FROG 1 also includes a hinge-stitched balaclava that allows the wearer to cover and uncover his nose and mouth without removing his helmet, and a set of gloves just like the aviators wear, only with better stitching, Hernandez said.

“It’s not more flame-retardant than flight gloves, but it’s more durable,” he said.

The higher level of protection — FROG 2 — replaces the utility uniform’s blouse and trousers with “enhanced combat shirt and trousers” made from a blend of synthetic fibers that will “self-extinguish” if ignited, Hernandez said. Another plus: The poly-fiber blend makes the shirt’s sweat-wicking torso cooler on hot summer patrols than the standard cammies.

“If you’re in a vehicle and there’s an explosion, that fire has no place to go, so you want to be in FROG 2,” Hernandez said. “By making FROG scalable, a commander can say everyone is in FROG 2 every time they step outside the wire.”

The Marine Corps has ordered enough FROG items to outfit 60,000 Marines, starting with those already deployed, Hernandez said. There are about 25,000 Marines in Iraq.

Everyone will receive a set of gloves, two long-sleeve undershirts, both light and medium-weight balaclavas, and two sets of the enhanced combat shirt and trouser combo, Hernandez said.

He said SysCom has begun sending the light balaclavas to Iraq. Delivery of the medium-weight balaclavas was completed the last week of February, and deployed Marines can expect delivery of the long-sleeve shirts to be complete by the end of March.

The FROG gloves and the combat shirts and trousers will appear at forward operating bases by the end of April, he said.

The FROG items are intended to replace the flight suits that some Marines have been wearing outside the wire after burn protection became a concern in late 2005. Early last year, Maj. Gen. Richard Zilmer, who then commanded I Marine Expeditionary Force’s forward element in Iraq, banned Marines from wearing certain commercially available sweat-wicking undershirts into battle because they melt and drip when exposed to flames.

“Marines wearing synthetic athletic clothing have received severe injuries due to the apparel adhering to the skin when exposed to intense heat from explosions,” Zilmer’s spokesman, 1st Lt. Antony Andrious, said at the time.

The FROG items don't melt or drip, Hernandez said. They can catch fire if they're directly exposed to intense flames, but that fire quickly dies out once the flames are removed, he said.

From a distance, it is difficult to tell the desert digital camouflage FROG items from standard cammies, so SysCom officials added a lower-leg pocket to the enhanced combat trousers to make them distinct, allowing commanders to gauge their Marines' level of protection just by looking at them, Hernandez said.

The enhanced combat shirt is already distinct — that is, when a Marine isn't wearing body armor over it. The shirt's sleeves are made from the same synthetic fiber blend as the trousers and look like the sleeves of a standard cammie blouse, but its zipper-down torso is made of a much lighter sweat-wicking "polyfiber blend," which allows Marines to stay cooler wearing a full combat load in FROG 2 than they can in cammies, Hernandez said.

SysCom materials engineer John Bauer said lab testing showed there was no need for Marines to wear heavy material under their body armor because that body armor itself was their best protection against burns to the torso.

Bauer took the FROG items to the lab at North Carolina State University in Raleigh last August, where he dressed a mannequin in varying combinations of the ensemble then subjected it to flames on all sides in four-second bursts.

The mannequin, nicknamed Pyroman, is equipped with 122 sensors that provide data about which areas of the body sustain first-, second- and third-degree burns following each test, Bauer said.

"These instruments on the mannequin measure the temperature and the duration of that temperature at each sensor, and there is a formula that predicts body burn," Bauer said. "At each sensor, it would register as no burn, second or third, and total burn. Obviously, the lower the burn, the better."

Using the standard combat utility uniform as a base line, the Corps was able to prove that the synthetic fibers used in FROG items "basically lower burn percentages," though exact figures on how much these percentages are lowered are still the subject of ongoing statistical analyses, Bauer said.

Even without all the results in, preliminary findings show "we're looking at a significant reduction, especially in third-degree burns" when the flame-retardant properties of FROG items are compared to those of the standard utility uniform, Bauer said. "It's definitely better. You don't have melt or drip hazards, and those are two critical things."

Bauer said he’s begun lab testing on future replacements to the FROG items made of better materials that hadn’t been invented when SysCom began asking manufacturers last February to pitch their products.